



THE
ONTARIO WATER RESOURCES
COMMISSION

INDUSTRIAL WASTE SURVEY

of the

STEEL COMPANY OF CANADA, LIMITED

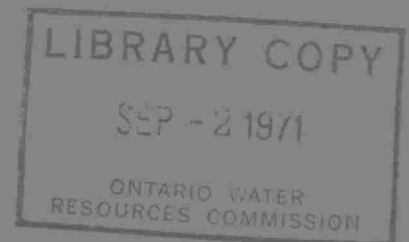
HILTON WORKS

HAMILTON

1966

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A
REPORT ON
AN INDUSTRIAL WASTES SURVEY
of
THE STEEL COMPANY OF CANADA, LIMITED - HILTON WORKS
Hamilton, Ontario

March, 1966

by
Division of Industrial Wastes
ONTARIO WATER RESOURCES COMMISSION

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AN INDUSTRIAL WASTES SURVEY OF

THE STEEL COMPANY OF CANADA, LIMITED - HILTON WORKS

March, 1966

The first major industrial wastes survey at the Steel Company of Canada's Hilton Works was carried out in March 1962. Since that time many waste treatment facilities have been installed and pollution control practices implemented at the plant. These efforts by the company to reduce their waste loadings, discharged to Burlington Bay, have been closely followed by the OWRC and minor surveys have been conducted to assess the efficiency of the treatment measures.

A major survey was carried out in March 1966 and the following report is based on that survey. The survey was carried out to obtain the current industrial waste loadings being discharged to the Bay by the Hilton Works. By a careful comparison of the 1962 and present survey, it is possible to perceive the degree of reduction in pollution achieved by the company's pollution control programme.

SUMMARY

The March 1966 industrial wastes survey carried out at the Steel Company of Canada's Hilton Works showed that a major reduction in water pollution of Burlington Bay has been achieved, since the previous survey in 1962. This reduction was achieved while an increase of approximately 27% in steel production was made.

The elimination of organic materials formerly discharged from the coking plant area was the largest single factor in the overall reduction. This was brought about by the installation of equipment designed to eliminate or recover materials previously discharged to the Bay.

The east side lagoon, receiving the majority of the company's

waste water, does not provide sufficient retention time and this results in large quantities of suspended solids being discharged to the Bay.

Further reductions in waste loadings, discharged to the Bay, are anticipated when the company's future pollution control plans become operational.

DETAILS OF SURVEY

Personnel

Throughout the entire survey, valuable assistance was given by the Steel Company of Canada personnel, including:

Mr. A. C. Elliot, Superintendent of Utilities

Mr. A. J. Lafreniere, Technical Supervisor, Air and Water Pollution

Mr. A. Schuldt, Assistant Engineer, Air and Water Pollution

Mr. L. Godrey, Utilities Technician

Mr. G. Harms, Utilities Technician

The following members of the Industrial Wastes Division took part in the survey:

Mr. R. C. Stewart, District Engineer

Mr. J. Luyt, Chemical Engineer

Mr. D. Tolson, Chemical Technologist

Mr. P. Hughes, Chemical Technologist

Plant and Processes

The Steel Company of Canada is a fully integrated steelworks employing some 13,500 people and operating 24 hours per day, 7 days per week. Approximately 3,800,000 tons of steel products are produced annually, and a small quantity of pig iron is sold directly to foundry operations. By-

products from the coking plant operations are either sold directly or further refined and sold as a finished product.

Raw materials required to produce the above are approximately:-
3,300,000 tons iron ore, 2,400,000 tons coal, 1,900,000 tons steel scrap and 800,000 tons limestone. Also required are varying quantities of zinc, tin, sulphuric and hydrochloric acids, oil products, dichromates, borates, sodium carbonate, sodium hydroxide and calcium oxide.

Coke is produced from the coal in gas-fired coke ovens. During the coking process, large volumes of gas are evolved which are used extensively in other areas of the plant. Other volatile products liberated from the coal on heating are ammonia liquor and tar; from these two products many organic compounds can be separated.

A sinter plant is used to prepare an iron ore concentrate suitable for reduction in the blast furnace; it utilizes coke fines from the breeze settling basins, solids washed from blast furnace gases and solids collected in the mill scale pits.

Coke, sinter, iron ore and limestone are fed in proportioned quantities to the blast furnaces. In the blast furnaces the iron ore is reduced to impure elemental iron. The reduction is brought about by hot carbon monoxide gas and carbon. Heated air is blown into the lower region of the furnaces and combines with the descending coke to produce the reducing gases and temperature necessary to bring about reduction. The decomposed limestone fluxes the impurities in the iron ore to produce a fusible slag which collects above the molten iron in the furnace hearth. The majority of the molten iron is charged to the open hearth furnaces for conversion into steel.

In the open hearth furnaces the impure iron is refined under oxidizing conditions to remove the impurities present. To speed up the oxidation, pure oxygen is blown into the molten bath. Molten steel from these furnaces is poured into ingot moulds to solidify and prepare ingots suitable for the subsequent shaping processes.

In the 'bloom mills' the reheated ingots are reduced to form 'billets'. After suitable preparation the billets are further reduced through a series of rolling procedures to produce a variety of finished rolled products, including bars, rods, railway spikes, wire, plate, sheet and strip.

Galvanizing and tinning are carried out on some of the products as well as other surface treatments. Prior to surface coating or treatment the steel is cleaned by pickling in either sulphuric or hydrochloric acids.

Process Wastes

Sinter Plant - The sinter plant operation functions to recover waste materials. Sludge, or underflow from the Walker Thickener is pumped to a smaller 30' Dorr clarifier. The solids from this are incorporated into the sinter product. A gas scrubber effluent from the sinter plant enters the Dorr clarifier. The overflow from the clarifier is discharged to the sewers.

Coking Plant - The coking plant and by-product plant produce several highly contaminated waste streams. An aqueous phase, 'ammonia liquor or flushing liquor', is obtained following the coal distillation. This liquor is recirculated to flush the hydraulic mains and act as a coolant in the primary coolers. Bay water is used to cool the flushing liquor but there is no direct contact of the two. The excess flushing liquor is directed to the phenol extraction plant and the ammonium sulphate plant before being sewerred. Vacuum

condensers on the ammonium sulphate process discharge a minor waste flow.

Another major source of waste from the coking plant was the final coolers. This cooling was by direct contact with Bay water. During the cooling the water picked up phenols, cyanides and naphthalenes, etc. After settling of the naphthalene, the waste was discharged to the sewers. A re-circulating final cooling system was installed in 1965 and was in operation for part of the survey period.

In this process the cooling media is a liquor that is re-circulated through air cooled heat exchangers. The naphthalene is settled from the liquor and added to the tar for sale as a by-product. This process eliminates wastes from the final coolers that were previously discharged to the sewers from the naphthalene settling sump.

In the benzol plant, separations and purifications are carried out to recover a range of organics, benzol, tuluol etc., from the tars. The rinse waters, following the acid and caustic washes, are discharged with condensate wastes from steam distillation. The waste stream is passed through an oil skimmer prior to discharge to the sewers. Cooling water from this area is discharged directly.

Coke Quenching Towers - Coke quenching is carried out with water used previously in the primary coolers. Quenching is intermittent, approximately one minute every ten minutes at each of the two quench stations. After quenching the water flows to breeze settling basins where the coke fines are settled out.

Blast Furnace Area - The exhaust gases from the blast furnaces are cleaned in Venturi type wet scrubbers and electrostatic precipitators.

The water from the scrubbers is directed to a large 130' diameter Walker Thickener for clarification, the overflow going directly to the sewer. The underflow from this thickener is pumped to the sinter plant for eventual feed to the sinter process. Cooling water from the blast furnaces and spray water, used periodically to wash the electrostatic precipitators, are discharged directly to the sewers.

Rolling Mills and Finishing Processes - Large volumes of water are used in the rolling mills both as a roll coolant and for partial de-scaling of the hot rolled steel. All water from these hot rolling operations is put through scale pits to remove the mill scale flushed from the de-scaling operations.

During finishing operations in the mills, acids, alkalis, fluxes and surface protecting solutions are used. The rinses from these processes are discharged continually and periodically batch dumpings are made. In the cold rolling operations, soluble oils are used extensively for cooling and lubricating. These spent oils are discharged continually to the sewers.

Two pickling lines use sulphuric acid for surface cleaning while a third line employs hydrochloric acid. The hydrochloric acid is recovered for use following the pickling operation. This acid recovery process was installed in 1965 and results in the elimination of acid discharges from this pickling. The spent acid is pumped to the recovery plant where a roaster converts the ferrous chloride solution into iron oxide and hydrogen chloride; the latter is absorbed in water to re-form hydrochloric acid solution.

Spent pickle liquor from the sulphuric acid pickling lines is discharged continually while periodic batch dumpings of spent acids are made from

several treatment processes. Studies are being conducted at the moment towards conversion of the sulphuric acid pickling lines to hydrochloric acid pickling with subsequent acid recovery.

Sampling and Analysis

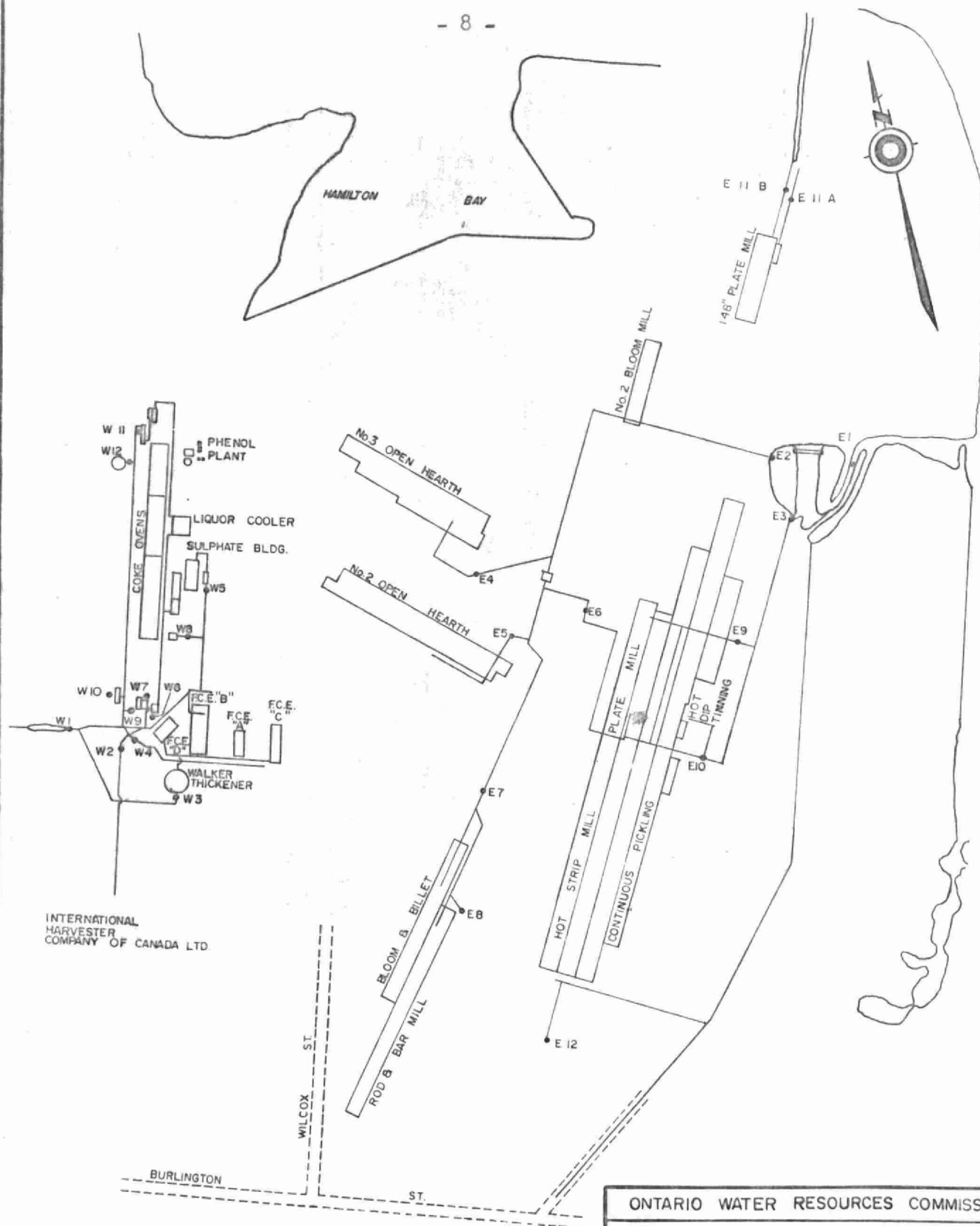
Several visits were made to the Hilton Works to select sampling points and set up the sampling programme. The points selected were chosen to coincide with the previous 1962 survey as closely as possible.

Sampling commenced on Monday, March 21st and continued through Thursday 24th. The west side of the plant was sampled on the 21st and 23rd together with the east side lagoon. On March 22nd and 24th the east side points were sampled. In general, each point was sampled over a two-day period for the two eight hour day shifts. Two composite samples were obtained for each day, made up of samples taken at half-hourly intervals from 9:00 am to 12:00 noon and from 1:00 pm to 4:00 pm. In all, 204 composite samples were taken. Grab samples were taken at all points throughout the sampling period.

The samples taken were returned the same evening to the OWRC laboratories for analysis. The analyses were carried out in accordance with the procedures described in "Standard Methods for Examination of Water and Wastewater", XII Edition.

Samples from the west side of the plant were analyzed for biochemical oxidation demand (BOD) suspended solids and pH as a routine procedure. To identify specific contaminants from the coking plant operations, analyses were carried out for phenol or phenol equivalent, cyanide, ether solubles and free ammonia. The east side samples were analysed for BOD, suspended solids and pH. Where specific contaminants such as chromium, zinc, and tin were suspected, analysis for these were carried out.

All analytical results obtained from the samples are appended to this report.



INTERNATIONAL
HARVESTER
COMPANY OF CANADA LTD.

ONTARIO WATER RESOURCES COMMISSION

STEEL CO. OF CANADA
LTD.

LOCATION OF SAMPLING POINTS

SCALE: NOT TO SCALE

DRAWN BY: R.D. HOGG

DATE: SEPT. 15, 1966

CHECKED BY: A.L.

DRAWING No. L-66-6

Estimated Waste Volumes

Waste water flows from the areas sampled are set out in the following table. Only flows of significance were included.

<u>Sample Point</u>	<u>West Side of Plant</u>	<u>M.I.G.H.</u>	<u>M.I.G.D.</u>
W. 3	Walker Thickener	0.5	12.00
W. 4	Low Level Sump	1.35	32.4
W. 8	Napthalene Sump	0.127	3.05
W.6,7,11	Primary Cooling Water and Coke Quench Water	0.304	7.3
W. 12	30' Dorr Thickener	0.0302	0.73
W. 5	Ammonia Still Liquor	0.04	0.96
W. 9	Benzol Plant Cooling Water	0.035	0.84
W. 10	Benzol Plant Separator Effluent	0.0108	0.26
W. 1	Flow through 'Open Cut' to Bay	2.4	57.6

All figures supplied by Steel Company of Canada Utilities Department.

<u>Sample Point</u>	<u>East Side of Plant</u>	<u>M.I.G.H.</u>	<u>M.I.G.D.</u>
E. 4	#3 Open Hearth Furnace	2.3	55.0
E. 5	#2 Open Hearth Furnace	0.747	17.8
E. 6	Hot Strip and Plate Mill	0.334	8.0
E. 7	#1 Bloom Mill	0.883	21.2
E. 8	Rod and Bar Mill Scale Pit	0.722	17.3
E. 9	Plate and Tin Mill	0.585	14.2
E. 10	Strip and Plate Mill	1.155	27.7
E. 2	West Inlet to Lagoon	5.04	120.96
E. 3	South Inlet to Lagoon	0.762	18.29
E. 1	Total Lagoon effluent	5.802	139.25
E. 11	148" Mill Scale Pit	0.296	7.1
E. 11B	148" Mill Clear Water Well	0.435	10.42
E. 12	Acid Recovery Plant, Pickle and Roll Shop	0.126	3.02

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ESTIMATED WASTE LOADINGS

During the sampling periods the east side lagoon was being dredged and the results obtained from this source were not considered representative. A further sampling programme was conducted in August and the results of this are included in a separate table.

Average concentrations from morning and afternoon composites were used in calculating the waste loadings. Adjustments were made to give net loadings. This was done by analyzing the service water and subtracting accordingly.

The following tables give individual waste constituent loadings according to the source or origin.

Sample Point No. and Location	<u>Major Sources of BOD</u>					
	** Con'c	Loadings	Con'c	Loading	Con'c	Loading
	ppm March 21/66	lbs/day March 21/66	ppm March 23/66	lbs/day March 23/66	ppm March/62	lbs/day March/62
W.4 Low Level Sump	9.1	2,950	3.4	1,100		
W.5 Ammonia still liquor	340	3,260	332	3,180	897	8,611
W.8 Napthalene Sump	160*	4,870	642	19,600	187	5,704
W.10 Benzol plant separator effluent	1,597	4,150	1,447	3,790	557	10,639
W. 1 West side open cut	35*	20,100	58	33,400	61	26,640
	March 22		March 24			
E.7 #1 Bloom Mill	6.8	1,440	7.3	1,550		
E.9 Plate and Tin Mill	9.1	1,280	8.5	1,198		
E.10 Strip and Plate Mill	21.5	5,960	18.0	4,970		
E.12 Acid recovery plant pickle and roll shop	177	5,320	133	4,010		
E.1 East side lagoon effluent	9.5	13,200			17	21,890

* Recirculating system on the final coolers was operating pm only.

** Con'c - Concentration

Major Sources of Suspended Solids

Sample Point No. and Location	Con'c	Loading	Con'c	Loading	Con'c	Loading
	ppm Mar. 21	lbs/day	ppm Mar. 23	lbs/day	ppm Mar. 1962	lbs/day
W.3 Walker Thickener Effluent	94	11,300	47	5,650		
W.4 Low level sump	40	13,000	29	9,400		
W.7 South breeze settling basin	6	259	49	2,110		
W.8 Napthalene sump	6*	193	106	3,220		
W.10 Benzol plant separator effluent	452	1,180	29	75		
W.11 North breeze settling basin			33	1,430		
W.1 West side open cut	52	30,000	31	17,900	42	18,350

* Recirculating system on the final coolers was operating pm only.

	Mar. 22		Mar. 24			
E.4 #3 Open hearth furnace	13	7,180				
E.5 #2 Open hearth furnace	11	1,870	8	1,430		
E.6 Hot strip and plate mill	37	2,960	19	1,520		
E.7 #1 Bloom mill	116	24,600	98	20,800		
E.8 Rod and bar scale pit	61	10,600	108	18,700		
E.9 Plate and tin mill	23	3,310	5	720		
E.10 Strip and plate mill	55	15,200	20	5,480		
E.11 148" Mill scale pit			99	10,300		
E.12 Acid recovery plant pickle and roll shop	606	18,200	214	6,440		
E.1 East lagoon effluent					68	87,560

Major Sources of Phenolic Wastes

Sample Point No. and Location	Con'c ppb	Loading lbs/day	Con'c ppb	Loading lbs/day	Con'c ppb	Loading lbs/day	Con'c ppb	Loading lbs/day
	March	21/66	March	23/66	August/63		March	/62
W.3 Walker thickener effluent	135	16.2	675	81.0	180	22.0	3,000	360.0
W.5 "Ammonia Still" Liquor	10,000	96.0	13,500	129.6	25,000	240.0	450,000	4,320
W.7 South breeze settling basin	1,025	14.4	1,875	27.0			12,000	259
W.8 Napthalene sump	10,000*	305	18,500	563.0	15,000	458.0	40,000	1,220
W.10 Benzol plant separator effluent	10,000	26.1	10,000	26.1	3,500	69.0	10,000	191
W.11 North breeze settling basin	1,250	14.8						
W.1 West side open cut	500*	287.0	2,000	1,150	1,500	655	8,000	3,494
* Recirculating system on the final coolers was operation pm only.								
		March 22		March 24				
E.8 Rod and bar scale pit	30	5.2	60	10.4				
E.9 Plate and tin mill	395	55.0	315	44.0				
E.10 Strip and plate mill	25	6.9	155	43.0				
E.1 East side lagoon effluent								386.0

Major Sources of Cyanide

Sample Point No. and Location	Con't ppm March 21/66	Loading lbs/day March 21/66	Con't ppm March 23/66	Loading lbs/day March 23/66	Con't ppm March, 1962	Loading lbs/day March, 1962	Con't ppm March, 1963	Loading lbs/day March, 1963
W.3 Walker thickener effluent	2.3	276	3.7	445	3.2	384	2.0	240
W.4 Low level sump	1.3	420	0.7					
W.5 'Ammonia Still' liquor	6.3	60	5.5	53	51	500	32	307
W.8 Napthalene	3.3*	100	79	2,400	170	5,185	80	2,440
W.10 Benzol plant separator effluent	7.1	45	36	94	21	401	17	325
W.12 30' Dorr thickener	3.3	24						
W.1 West side open cut	3.5	2,100	5.9	3,400	9.4	4,106	8.2	3,514

* Recirculating system on the final coolers was operating pm only.

Major Sources of Iron

Sample Point No. and Location	Con'c	Loading	Con'c	Loading	Con'c	Loading
	ppm	lbs/day	ppm	lbs/day	ppm	lbs/day
	March 21/66		March 23/66		March /62	
W.3 Walker thickener effluent	8.3	950	8.9	1,070		
W.4 Low level sump	2.0	650	6.4	2,040		
W.12 30' Dorr thickener	12.1	88	16.7	121		
W.1 West side open cut discharge	2.9	1,670	9.9	5,700	6.0	2,620
	March 22		March 24			
E.4 #3 Open hearth furnace	1.9	1,050	1.3	719		
E.5 #2 Open hearth furnace	4.4	788	4.7	840		
E.6 Hot strip and plate mill	1.4	112	9.7	775		
E.7 #1 Bloom mill	36.3	7,700	45	9,550		
E.8 Rod and bar scale pit	34.9	6,200	68.9	11,900		
E.9 Plate and tin mill	2.9	408	3.3	464		
E.10 Strip and plate mill	112.8	31,200	264.	73,000		
E.11 148" Mill scale pit	15	1,060	63.8	4,520		
E.12 Acid recovery plant pickle and roll shop						
E.2 West inlet to lagoon						
E.3 South inlet to lagoon						
E.1 East lagoon discharge					60	77,256

DISCUSSION OF RESULTS

The operation of the re-circulating system on the final coolers has resulted in a large reduction of polluting materials being discharged from the coking plant area.

Loadings at Napthalene Sampling Point:

	<u>Re-circulating System Operating</u>				<u>Original System</u>	
	Con't ppm	Loading lbs/day	Con't ppm	Loading lbs/day	Con't ppm	Loading lbs/day
	March 24		March 21		March 23	
BOD	32	975	160	4,870	642	19,600
Suspended solids	0.0	-	6	193	106	3,280
Cyanides	-	-	3.3	100	79	2,400
Phenols	6,000	210	10,000	350	18,500	563

These reductions are also reflected in the loadings observed at the west outfall to Burlington Bay.

The performance of the Walker Thickener in settling suspended solids is much the same as was found in the previous results of 1962, 1963 and 1965; an average reduction of approximately 90% is achieved. Thus on the 21st an overflow from the thickener was discharged with suspended solids at the rate of 11,300 lbs per day from an influent rate of 132,000 lbs per day, (91%) while on the 23rd the rate was 5,650 pounds per day from an influent rate of 82,000 lbs per day, (93%).

A large quantity of suspended solids are discharged from the spray washing of the blast furnace electrostatic precipitators. The concentration of solids is low, but the flow of 32.4 M.I.G.D. results in an approximate discharge of 11,000 lbs per day.

The east side lagoon was being dredged at the time of the March survey and the results were not considered representative. Following changes in the operation of this lagoon, composite samples were taken on August 25th and show that the lagoon is presently ineffectual in removing suspended solids.

	<u>South Inlet</u>		<u>West Inlet</u>		<u>Lagoon Outfall</u>	
	Con'tc ppm	Loading lbs/day	Con'tc ppm	Loading lbs/day	Con'tc ppm	Loading lbs/day
Suspended Solids	115	21,000	22	26,600	41	57,000

There is a possibility that iron in solution in the lagoon influent is being precipitated, when the pH is raised in the lagoon, and not having sufficient retention time for settling.

The ether solubles analytical results indicate that a large quantity of oil is being discharged in the lagoon effluent. Although some oil is being retained by the oil skimming device at the lagoon outlet, it appears that the effluent velocity in the channel leading to the outlet does not allow the oil to separate fully.

In the samples taken at sampling point E.12, the sewer line receiving wastes from the acid recovery plant and 80" mill, high concentrations of oils were found. The extreme concentrations, 498,000 and 57,000 ppm probably resulted from 'surface sampling' but nevertheless they are indicative of large oil discharges from the area.

REMARKS

The installation of waste treatment facilities and changes in operation on the west side of the plant, have resulted in a reduction in the quantities of

polluting materials discharged to Burlington Bay.

Phenols, cyanides, nitrogenous compounds and suspended solids have all been reduced greatly by the operation of the phenol extraction plant and the re-circulation system installed on the final gas coolers. The proposed installation of a closed circulating system on the coke quench water, should result in further reduction of phenolic discharges to the Bay. The remaining major source of cyanide-bearing wastes is the effluent from the Walker Thickener. While the concentration is low, the high flow results in a discharge of approximately 350 pounds per day. This thickener is currently overloaded and while it is efficient in settling suspended solids, the effluent still carries approximately 8,500 pounds per day of solid material to the Bay.

The east side lagoon does not produce a satisfactory effluent. In the present and previous surveys, results have shown that only a minimum amount of suspended material is removed from the large volume, 140 mgd, of wastewater discharged to the lagoon. It is likely that insufficient retention time is provided in the lagoon to give satisfactory settling conditions. This situation should be improved when the proposed storm sewer, to serve #3 Open Hearth Shop, is installed. The sewer will carry approximately 47 mgd of cooling water directly to the Bay, thus increasing the effective retention time in the lagoon. In the meantime, however, regular and proper dredging of the lagoon would help the situation.

The oil separator at the lagoon is not providing the best possible removal. This probably results from the lagoon size and the method of operation.

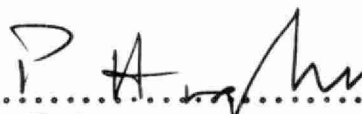
Large quantities of oil and spent pickle liquor are being discharged through the company sewer which joins the Hamilton storm sewer to the Bay.

The separation and elimination of oil, preferably at the source

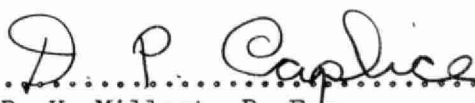
within the plant, should be improved. Some means of eliminating the oil, discharged to the Hamilton storm sewer, should also be found.

The proposed conversion of the remaining sulphuric acid pickling lines, to hydrochloric acid pickling with acid recovery, would result in the elimination of large discharges of soluble iron and acid to the Bay. Failing this, the Company should investigate methods of neutralizing the acid and removing iron and sulphate from the spent pickle liquor.

Prepared by:


.....
P. Hughes,
Chemical Technologist,
Division of Industrial Wastes.

Approved by:


.....
for R. H. Millest, P. Eng.,
Director,
Division of Industrial Wastes.

PH:dj

A P P E N D I X

INDUSTRIAL WASTE ANALYSIS

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: R. Stewart*		c.c.		ps	
Source: Stelco							
Date Sampled: May 31/66		by: D. Hughes					

Lab. No.	5-Day B.O.D.	Solids			pH	I R O N as Fe		Phenols in ppb	Cyanide as C.N.	Ether Solubles	C.O.D.	Free Ammonia as N
		Total	Susp.	Diss.		Tot.	Diss.					
T-1561	4.2	352	27	325	8.2	0.70	0.06	2	0.0	0	37	2.46
T-1562	7.2	**	**	**	8.0	0.81	0.05	0	0.0	0	18	**
T-1563	13	**	**	**	8.1	0.71	0.04	4	0.0	0	18	**
T-1564	3.2	**	**	**	8.1	0.65	0.05	0	0.0	0	22	**
T-1565	2.2	364	23	341	7.9	0.67	0.05	8	0.0	0	18	4.27
T-1566	6.4	**	**	**	7.9	0.65	0.05	6	0.0	0	22	**
**Sample exhausted, tests could not be performed												

T-1561	1	Raw Water #1 Intake Comp 11-3.30										
T-1562	2	Raw Water #1 Intake Grab 11.30										
T-1563	3	Raw Water #1 Intake Grab 2.00										
T-1564	4	Raw Water Chlorinated (11-15)#2 Intake										
T-1565	5	Raw Water #2 Intake Comp 11 - 3.30										
T-1566	6	Raw Water #2 Intake Grab 2.00										

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: March 24/66 by: J.L. P.H. D.T.

(rd)

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron as Fe.		Phenols in ppb	Ether Solubles		
		Total	Susp.	Diss.			Tot.	Diss.				
T-761	4.6	404	6	398	7.5	28	1.5	0.13	20	1.4		
T-762	15	516	48	468	7.1	80	7.6	0.69	600	6.2		
T-763	14	554	60	494	7.0	100	15.2	0.29	600	7.0		

- T-761 1. East Side # 11B - Grab 3:35 p.m. (duplicate)
- T-762 2. West Side #1 - Open Cut - Grab 1:30 p.m. (duplicate)
- T-763 3. West Side #1 - Open Cut - Grab 3:15 p.m. (duplicate)

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Luyt *		c.c.									
Source: Stelco													
Date Sampled: March 21/66 by: P. Hughes		kr											
Lab. No.	5-Day B.O.D.	Solids			Cyanide as HCN	Phenols in ppb.	Free Ammonia as N	Other Solubles	C C D	pH at Lab.	Iron as Fe		
		Total	Susp.	Diss.							Tot.	Diss.	
T 640	200.	496	55	441	5.1	1000	6.56	0.4	748	6.9	4.8	0.12	
T 641	20.	470	74	396	1.1	100	4.60	0.0	122	8.0	5.2	0.09	
T 642	35.	282	64	218	3.5	500	7.38	2.4	50	7.8	3.6	0.24	
T 643	37.	490	88	402	0.0	80	3.61	0.0	130	7.8	4.9	0.11	
T 640	1.	West Side #1 - Open cut total effluent					Comp. 9 - 12						
T 641	2.	West Side #2 - International Harvester					Comp. 9 - 12						
T 642	3.	West Side #1 - Open cut total effluent					Comp. 1 - 4						
T 643	4.	West Side #2 - International Harvester					Comp. 1 - 4						

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

(rd)

Source: Stelco

Date Sampled: March 23/66 by: D. Tolson

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Iron as Fe.		Cyanide as HCN	Ether Solubles	Phenol in ppb	Ammonia as NH ₃	C.O.D.	
		Total	Susp.	Diss.		Tot.	Diss.						
T-715	59	406	30	376	6.7	9.5	0.62	7.5	12.	2,000	9.02	150	
T-716	62	428	46	382	7.1	13.2	0.88	4.3	7.0	2,000	9.02	130	
T-717	6.4	396	36	360	7.1	10.9	0.19	0.7	0.0	100	4.92	80	
T-718	6.4	408	36	372	7.7	5.3	0.14	0.7	3.2	50	6.56	42	

T-715 West Side #1 (Open Cut) Composite 9:00 a.m. - 12:00 a.m.
T-716 West Side #1 (Open Cut) Composite 1:00 p.m. - 4:00 p.m.
T-717 West Side #4 Composite 9:00 a.m. - 12:00 a.m.
T-718 West Side #4 Composite 1:00 p.m. - 4:00 p.m.

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CHEMICAL LABORATORIES
INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

(rd)

Source: Stelco

Date Sampled: March 23/66 by: D. Tolson

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Iron as Fe.		Cyanide as HCN	Ether Phenols Solubles in ppb	Free Ammonia as N	C.O.D.	
		Total	Susp.	Diss.		Tot.	Diss.					
T-712	43	444	40	404	7.4	2.2	0.32	0.0	11.	100	3.28	99
T-713	23	712	152	560	6.6	54.0	15.6	0.0	120.	80	3.61	88
T-714	118	430	40	390	6.9	7.4	0.37	6.3	14.	2,000	8.20	190

T-712 West Side #2 (International Harvester) Composite 9:00 a.m. - 12:00 a.m.

T-713 West Side #2 (International Harvester) Composite 1:00 p.m. - 4:00 p.m.

T-714 West Side #1 - (Open Cut) - Grab - 2:00 p.m.

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Luyt *		c.c.	
Source: Stelco					
Date Sampled: March 23/66 by: DS Tolson		br			

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C O D	Iron as Fe		Cyanide as HCN	Phenols in ppb.	Free Ammonia as N	Ether Solubles
		Total	Susp.	Diss.			Tot.	Diss.				
T 743	7.0	1164	690	474	6.8	720	37.3	1.22	3.5	500	7.80	5.2
T 744	6.0	1104	686	418	6.8	700	28.3	1.31	6.3	600	7.80	0.6
T 745	4.0	520	63	457	6.7	72	12.2	1.07	3.9	750	7.80	0.4
T 746	4.0	514	44	470	6.4	58	8.6	1.30	3.5	600	6.96	0.0

T 743	1.	Comp. 9 - 12 am	)	West Side #3A - Walker Thickener Influent
T 744	2.	Comp. 1 - 4 pm		
T 745	3.	Comp. 9 - 12 am	)	West Side #3B - Walker Thickener Effluent
T 746	4.	Comp. 1 - 4 pm		

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: March 21/66 by: P. Hughes

br

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Iron	as Fe	Cyanide as HCN	Phenols in ppb.	Free Ammonia as N	Ether Solubles		
		Total	Susp.	Diss.		Tot.	Diss.						
T 660	2.2	498	136	362	6.8	10.4	0.17	2.7	240	8.54	0.0		
T 661	4.0	1604	1174	430	6.4	52.5	0.06	3.1	8	8.54	16.		
T 662	2.2	514	66	448	6.9	9.2	0.31	1.9	30	9.20	5.2		
T 663	3.2	1520	1052	468	7.5	69.5	0.23	2.3	400	9.20	23.		

T 660	1.	West Side #3B - Clarifier effluent	Comp. 9 - 12
T 661	2.	West Side #3A - Clarifier Influent	Comp. 9 - 12
T 662	3.	West Side #3B - Clarifier effluent	Comp. 1 - 4
T 663	4.	West Side #3A - Clarifier influent	Comp. 1 - 4

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Iuyt *		c.c.									
Source: Stelco													
Date Sampled: March 21/66 by: P. Hughes												br	
Lab. No.	5-Day B.O.D.	Solids			Cyanide as HCN	Phenols in ppb.	Free Ammonia as N	Ether Solubles	C O D	pH at lab.	Iron as Fe		
		Total	Susp.	Diss.							Tot.	Diss.	
T 644	15.	518	56	462	1.5	4	5.90	0.4	21.5	8.0	3.2	0.06	
T 645	9.2	466	38	428	1.1	40	6.56	0.0	11.5	8.2	3.7	0.09	
T 646	17.	470	66	404	1.9	240	9.20	19.	*	*	3.7	0.19	
* Sample exhausted, test could not be performed.													
T 644	1.	West Side #4 - Influent to low level sump						Comp. 9 - 12					
T 645	2.	West Side #4 - Influent to low level sump						Comp. 1 - 4					
T 646	3.	West Side end of cut						Grab 2 - 15					

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES
INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Luyt *		c.c.		(rd)	
Source: Stelco							
Date Sampled: March 23/66 by: P. Hughes							

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Iron	as Fe.	Ether Solubles	Free Ammonia as N	Phenol in ppb	Cyanide as HCN	C.O.D.
		Total	Susp.	Diss.		Tot.	Diss.					
T-723	6.0	530	68	462	8.7	4.3	0.21	4.0	4.60	1250	0.0	106
T-724	6.0	358	6	352	7.2	3.7	0.41	7.6	7.22	20	0.0	42
T-725	13	428	44	384	8.3	2.4	0.20	8.0	6.56	2500	0.0	233
T-726	5.6	320	14	306	7.2	3.7	0.38	0.2	9.85	80	0.0	57

T-723	1.	West Side #7 Coke Quench Effluent - Comp. 9 - 12 Duplicate.
T-724	2.	West Side #6 Coke Plant Cooling Water - Comp. 1 - 4 Duplicate.
T-725	3.	West Side #7 Coke Quench Effluent - Comp. 1 - 4 Duplicate.
T-726	4.	West Side #6 Coke Plant Cooling Water - Comp. 9 - 12 Duplicate.

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 part in 1,000,000 parts by weight
= 1 lb. in 1,000,000 lbs. Gals.

Municipality: <u>St. Louis</u>		Report to: <u>St. Louis</u>		c.c.	
Source: <u>St. Louis</u>					
Date Sampled: <u>Aug. 21/54</u> by: <u>J. H. Smith</u>					

Lab. No.	5-Day B.O.D.	Solids			pH	Total Solids	Diss. Solids	Suspended Solids	Total Solids	Diss. Solids	Suspended Solids	Total Solids	Diss. Solids	Suspended Solids
		Total	Susp.	Diss.										
1	1.2	2.2	2	2.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
2	1.0	2.0	5	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
3	1.5	1.5	10	3.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
4	1.8	1.8	12	3.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	

Left side of - This sample water from -

Right side of - This sample water from -

Left side of - This sample water from -

Right side of - This sample water from -

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CHEMICAL LABORATORIES
INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: G. Invt *

c.c.

Source: Steelco

Date Sampled: March 21/66 by: D. Tolson

Lab. No.	5-Day B.O.D.	Solids			Ether solubles	Free Ammonia as N	pH	Total Sulphate as SO ₄	Total Nitrate as NO ₃	Total Chloride as Cl	Total Sulphate as SO ₄	Total Iron as Fe	Total Copper as Cu
		Total	Susp.	Diss.									
T 632	305	8076	36	8040	36.	1312.	8.	*	8.2	6.7	10000	17.0	1.3
T 633	350	8084	40	8044	26.	1312.	8.	*	8.0	5.9	10000	20.0	1.33
T 634	1000.	450	14	436	680.	0.13	-	-	7.2	113.5	30000	2.2	0.94
T 635	160.	464	12	452	0.4	4.90	-	-	7.0	3.3	10000	2.5	0.45
	C O D												
T 632	2190								* see separate report				
T 633	2710												
T 634	2618												
T 635	281												

T 632 5A. Composite 9 am - 12 am)
T 633 5B. Composite 1 pm - 4 pm)
T 634 6A. Composite 9 am - 12 am)
T 635 6B. Composite 1 pm - 4 pm)

Ammonia liquor

Lightthalene surf

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: March 23/66 by: P. Hughes

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Iron as Fe.		Ether Solubles	Free Ammonia as N	Phenol in ppb	Cyanides as HCN	Sulphides as H ₂ S Thiocyanates		C.O.D. 1942
		Total	Susp.	Diss.		Tot.	Diss.							
T-719	360	7252	44	7208	6.5	11.5	1.6	27.	2140.	12,000	7.1	0.0*	**	1942
T-720	310	7270	26	7244	6.5	6.0	1.4	19.	2140.	15,000	3.9	0.0*	**	1922
T-721	640	374	128	246	7.2	3.0	2.0	100.	0.12	25,000	116	---	---	1238
T-722	650	334	98	236	7.2	3.7	1.27	8.8	11.5	12,000	43	---	---	822
* Test performed April 26: Any Sulphide that might have been present, could have been oxidized.														
** See Seperate Report.														

- T-719 1. West Side #5 - Ammonia Liquor Eff. Comp. 9 - 12 Duplicate.
- T-720 2. West Side #5 - Ammonia Liquor Eff. Comp. 1 - 4 Duplicate.
- T-721 3. West Side #8 - Naphthalene Sump - Comp. 9 - 12 Duplicate.
- T-722 4. West Side #8 - Naphthalene Sump - Comp. 1 - 4 Duplicate.

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

(rd)

Source: Stelco

Date Sampled: March 25/66 by: P. Hughes

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Ether Solubles	Iron Tot.	as Fe. Diss.	Phenol in ppb	Free Ammonia as N.	Cyanide as HCN	C.O.D.
		Total	Susp.	Diss.								
T-727	1550	5446	32	5414	11.4	4400.	3.3	2.3	10,000	164.	40.0	29760
T-728	1350	5844	40	5804	11.4	3680.	3.2	---	10,000	180.	32.0	23808
T-729	6.4	340	8	332	7.3	1.4	3.5	0.18	10	9.20	0.0	30
T-730	6.0	360	12	348	7.2	2.6	3.5	0.13	10	16.4	0.0	26

- T-727 1. West Side #10 Benzol Plant Separator - Comp. 9 - 12 Duplicate.
- T-728 2. West Side #10 Benzol Plant Separator - Comp. 1 - 4 Duplicate.
- T-729 3. West Side #9 Benzol Plant Cooling Water - Comp. 9 - 12 Duplicate.
- T-730 4. West Side #9 Benzol Plant Cooling Water - Comp. 1 - 4 Duplicate.

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: March 21/46 by: D. Tolson

br

Lab. No.	5-Day B.O.D.	Solids			Oxalate as H ₂ O ₂	Ether Solubles	Phenols in ppt.	Free Chromic as Cr	C.C.D. at 12h.	pH	Iron as Fe		
		Total	Susp.	Diss.							Tot.	Diss.	
T 636	7.6	338	6	332	0.5	1.6	30	6.56	11.5	7.8	1.2	0.11	
T 637	13.	362	5	357	5.9	0.0	20	6.56	92	7.1	2.1	0.07	
T 638	1500	4500	380	4120	16.0	3200.	13000	8.20	21800	11.0	2.1	-	
T 639	1700	6346	538	5808	18.3	5600.	6000	8.20	18950	11.1	2.6	-	

T 636	9A.	Composite 9 am - 12 am	) Benzol cooling water
T 637	9E.	Composite 1 pm - 4 pm	
T 638	10A.	Composite 9 am - 12 am	) Benzol plant sep. effluent
T 639	10E.	Composite 1 pm - 4 pm	

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: March 24/66 by: FH/DT/JL

br

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C O D	Iron as Fe		Phenols in ppb.	Cyanide as HCN	Ether Solubles	Free Ammonia as N	
		Total	Susp.	Diss.			Tot.	Diss.					
T 740	5.4	378	6	372	7.2	19	2.5	0.18	10	0.0	0.8	6.16	
T 741	4.4	460	40	420	8.4	172	3.1	0.21	750	0.0	10.	4.43	
T 742	5.6	648	72	576	8.0	138	13.6	0.12	400	3.5	11.	6.96	

T 740	1.	West Side N. Quench overflow	Grab - 4:15 pm
T 741	2.	West Side N. Quench effluent	Grab - 4:15 pm
T 742	3.	West Side North Thickener effluent	Grab - 4:15 pm

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES
INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Luyt *		c.c.									
Source: Stelco													
Date Sampled: March 22/66		by: J. L.										br	
Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C O D	Phenols in ppb.	Iron as Fe		Zinc as Zn	Tin as Sn		
		Total	Susp.	Diss.				Tot.	Diss.				
T 669	21	832	524	308	7.1	99	40	70.0	0.55	0.7	1.6		
T 669	1	East Side #1 - Lagoon Effluent - Grab 2:15 p.m.											

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: March 23/66 by: J.I.

br

Lab. No.	5-Day B.O.D.	Solids			pH at lab.	C O D	Iron as Fe		Phenols in ppb.	Zinc as Zn	Tin as Sn	Ether Solubles	
		Total	Susp.	Diss.			Tot.	Diss.					
T 703	12	616	192	424	6.4	57	47.5	9.3	120	0.8	1.0	14.	
T 704	7.2	510	88	422	6.1	19	31.5	11.1	80	0.5	0.2	0.0	
T 705	6.4	386	20	366	7.2	38	9.0	0.35	80	0.2	0.0	0.0	
T 706	5.6	384	8	376	7.3	38	6.3	0.31	15	0.0	0.0	2.2	

T 703	1	Comp. 8.30 am - noon	)	East Side #1 - Lagoon Effluent
T 704	2	Comp. 1.30 pm - 4.00 pm)	
T 705	3	Comp. 8.30 - 12 noon	)	East Side #2 - West Influent to Lagoon
T 706	4	Comp. 1.00 - 4.00 pm)	

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES
INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Fort #		c.c.	
Source: diesel					
Date Sampled: March 21/66 by: JI/LT/LL					

Lab. No.	5-Day B.O.D.	Solids			pH at 1 hr.	Oil & Grease	Expressed as %		Benzene	Cine	Other	Tin	
		Total	Susp.	Diss.			Vol.	Wts.					
T 647	17.	548	216	332	6.7	16	66.6	1.30	160	7.6	8.4	0.9	
T 648	12.	480	188	292	6.8	53	60.0	1.35	140	0.4	0.0	0.6	
T 649	2.0	376	23	353	7.9	94	9.5	0.10	0	0.3	71.	0.0	
T 650	4.8	394	19	375	7.9	167	11.3	0.12	10	0.2	6.8	0.0	

T 647	1.	East Side #1 - Lagoon effluent	Comp. 9 - 12 noon
T 648	2.	East Side #1 - Lagoon effluent	Comp. 1 - 4
T 649	3.	East Side #2 - West influent to lagoon	Comp. 9 - 12 noon
T 650	4.	East Side #2 - West influent to lagoon	Comp. 9 - 12 noon

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality:		Hamilton		Report to:		J. Luyt *		c.c.					
Source:		Stelco											
Date Sampled: March 23/66 by: J. Luyt													
Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron as Fe.		Phenols in ppb	Zinc as Zn.	Tin as Sn.	Ether Solubles	
		Total	Susp.	Diss.			Tot.	Diss.					
T-707	13	1050	4	1046	2.7	30	163	158	240	1.1	0.2	220.	
T-708	11	972	40	932	2.8	99	142	135	240	0.8	0.2	20.	
T-709	10	620	220	400	**	**	**	8.3	100	0.6	0.7	13.	
T-710	2.8	376	10	366	**	**	**	0.35	80	0.0	0.0	4.4	
T-711	11	856	46	810	**	**	**	114	300	0.9	0.4	78.	
** Sample exhausted, test could not be performed.													
T-707	1.	East Side #3 - South Influent to Lagoon - Comp. 8:30 - 12:00 noon (Duplicate)											
T-708	2.	East Side #3 - South Influent to Lagoon - Comp. 1:00 - 4:00 p.m. (Duplicate)											
T-709	3.	East Side #1 - Lagoon Effluent - Grab 11:15 a.m.											
T-710	4.	East Side #2 - Grab 11:00 a.m.											
T-711	5.	East Side #3 Grab 11:00 a.m.											

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton Report to: J. Luyt * c.c. Chem. Lab. - *

Source: Stelco

Date Sampled: Mar. 22/66 by: D. Tolson

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Iron	as	Fe.	Phenol in ppb	Ether Solubles	C.O.D.		
		Total	Susp.	Diss.		Tot.		Diss.					
T-675	2.4	344	10	334	7.3	3.1		0.07	30	2.8	36		
T-676	4.4	322	30	292	7.2	3.7		0.12	8	0.4	42		
T-677	4.4	346	20	326	7.5	6.1		0.11	8	0.0	7.6		
T-678	5.6	370	16	354	7.4	5.6		0.09	6	0.0	15		

T-675 East Side #4 Composite 9 a.m. - 12 am.
T-676 East Side #4 Composite 1 pm - 4 pm.
T-677 East Side #5 Composite 8:30 a.m. - 12 am.
T-678 East Side #5 Composite 1 pm - 4 pm

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gal.

Municipality: Hamilton Report to: J. Luyt * c.c. (rd)

Source: Stelco

Date Sampled: March 24/66 by: J.L. P.H. D.S.T.

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron	as	Fe.	Phenols	Ether		
		Total	Susp.	Diss.			Tot.	Diss.		in ppb	Solubles		
T-747	1.6	388	4	384	7.6	40	2.9	0.32		25	0.0		
T-748	3.4	392	6	386	7.6	40	2.6	0.34		6	0.0		
T-749	4.6	536	12	524	7.5	40	6.0	0.51		6	0.0		
T-750	4.4	410	18	392	7.4	20	6.5	0.26		6	0.8		

T-747	1.	East Side #4	#3 O.H. Cooling water -	Comp. 9 - 12 a.m. (Duplicate)
T-748	2.	East Side #4	#3 O.H. Cooling water -	Comp. 1 - 4 p.m. (Duplicate)
T-749	3.	East Side #5	#2 O.H. Cooling water & shops -	Comp. 9 - 12 a.m. (Duplicate)
T-750	4.	East Side #5	#2 O.H. Cooling water & shops -	Comp. 1 - 4 p.m. (Duplicate)

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES
INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

(rd)

Source: Stelco

Date Sampled: March 24/66 by: J.L. D.T. P.H.

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron as Fe.		Phenols in ppb.	Ether Solubles	Zinc as Zn.		
		Total	Susp.	Diss.			Hot.	Diss.					
T-751	6.8	386	26	360	7.7	58	14.5	0.33	60	0.0	0.2		
T-752	6.0	396	26	370	7.5	58	7.9	0.33	25	12.	0.3		

T-751 1. East Side #6 Hot Strip and Plate - Comp. 9 - 12 a.m. (Duplicate)

T-752 2. East Side #6 Hot Strip and Plate - Comp. 1 - 4 p.m. (Duplicate)

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES
INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c. Chem. Lab.-*

Source: Stelco

Date Sampled: March 22/66 by: P. Hughes

(rd)

Lab. No.	5-Day B.O.D.	Solids			C.O.D. _e	pH at Lab.	Iron as Fe.		Phenol in as	Ether Solubles	Zinc as Zn.		
		Total	Susp.	Diss.			Total	Diss.					
T-679	7.2	404	70	334	61	7.6	38.0	0.19	6	0.0	---		
T-680	5.0	420	66	354	53	7.6	34.8	0.15	10	3.6	---		
T-681	9.6	560	176	384	76	7.3	35.5	0.16	30	3.4	0.4		
T-682	10	406	69	337	76	7.9	37.0	0.29	8	0.8	0.4		

- | | | |
|-------|----|---|
| T-679 | 1. | East Side #8 Scale Pit Rod & Bar Mills - (Comp. 9-12) |
| T-680 | 2. | East Side #8 Scale Pit Rod & Bar Mills - Comp. 1 - 4 |
| T-681 | 3. | East Side #7 #1 Bloom Mills - Comp. 9 - 12. |
| T-682 | 4. | East Side #7 #1 Bloom Mill - Comp. 1 - 4 |

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Luyt *		c.c.									
Source: Stelco													
Date Sampled: March 24/66 by: P.H. D.T. J.L. (rd)													
Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron as Fe.		Phenols in ppb	Zinc as Zn.	Ether Solubles		
		Total	Susp.	Diss.			Tot.	Diss.					
T-753	11	274	75	199	7.3	80	32.2	0.47	60	0.2	13.		
T-754	9.6	498	134	364	7.3	80	60.8	0.75	20	0.2	20.		
T-755	8.8	476	82	394	7.4	58	40.8	0.39	100	0.3	13.		
T-756	6.8	512	148	364	7.5	58	100.	0.52	30	0.3	15.		
T-753	1.	East Side #7	#1 B.M.	Comp. 9:00 a.m. - noon.									
T-754	2.	East Side #7	#1 B.M.	Comp. 1:00 - 4:00 p.m.									
T-755	3.	East Side #8	Rod and Bar Mill	Comp. 9:00 a.m. - 12 noon.									
T-756	4.	East Side #8	Rod and Bar Mill	Comp. 1:00 - 4:00 p.m.									

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

(rd)

Source: Stelco

Date Sampled: March 24/66 by: P. Hughes

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Iron	as Fe.	Ether Sol.	Phenol in ppb	Zinc as Zn.	C.O.D.		
		Total	Susp.	Diss.		Tot.	Diss.						
T-765	7.2	468	88	380	7.7	16.2	0.41	**	60	0.2	32		
T-766	8.4	528	198	330	7.6	57.3	0.65	**	60	0.3	60		
** Sample exhausted.													

- T-765 1. East Side #8 Scale Pit - Grab S. Outfall 3:30
- T-766 2. East Side #8 Scale Pit - Grab W. Outfall 3:30

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

C.C. Chem. Lab. - *

Source: Stelco

(rd)

Date Sampled: March 22/66 by: P. Hughes

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	pH at Lab.	Iron		Phenol in ppb	Ether Solubles			
		Total	Susp.	Diss.			Tot.	Diss.					
T-683	4.4	344	17	327	15	7.8	**	0.12	10	26.			
T-684	5.2	376	50	326	64	7.8	14.0	0.12	10	9.8			
** Sample exhausted, test could not be performed.													

T-683 5. East Side #8 Scale Pit, Rod & Bar - Grab (W. Side) 2:00

T-684 6. East Side #8 Scale Pit, Rod & Bar - Grab (S. Side) 1 - 50.

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 imp. Gals.

Municipality: Hamilton

Report to: J. Layt *

c.c.

Source: Stelco

Date Sampled: March 21/66 by: J.L.

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Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C O D	Iron as Fe		Phenols in ppb.	Zinc as Zn	Ether Solubles	Tin as Sn	
		Total	Susp.	Diss.			Tot.	Diss.					
T 651	41	1190	94	1096	2.9	264	171	105	480	7.7	160.	2.7	
T 652	16.	872	48	824	3.4	130	123	115	240	0.7	70.	0.4	
T 653	12.	394	20	374	7.2	130	6.1	0.17	240	0.2	4.2	0.4	
T 654	130	1426	27	1399	2.8	168	238	223	120	2.0	100.	0.0	

T 651	1.)	East Side #3 - South influent to lagoon	Comp. 9 - 12
T 652	2.)		Comp. 1 - 4
T 653	3.	East Side #9 -	Comp. 1 - 4
T 654	4.	East Side #10 -	Comp. 1 - 4

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

C.C. Chem. Lab.-*

Source: Stelco

(rd)

Date Sampled: Mar. 22/66 by: J. Luyt

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron	as	Fe.	Phenols in ppb	Ether Solubles	Tin as Sn.	Zinc as Zn.	
		Total	Susp.	Diss.			Tot.		Diss.					
T-689	29	936	68	868	4.2	34	128		123	20	30.	1.4	0.2	
T-690	20	850	56	794	5.1	76	100.5		66	40	19.	0.0	2.4	
T-691	5.2	440	66	374	7.4	23	2.60		0.12	20	7.4	0.0	0.4	
T-692	3.8	406	22	384	7.4	43.9	2.98		0.10	15	20	0.0	0.3	

T-689	1.	East Side #10	Comp. 9:30 - noon (Duplicate)
T-690	2.	East Side #10	Comp. 1:00 - 4:00 pm (Duplicate)
T-691	3.	East Side #6	Comp. 8:30 - noon (Duplicate)
T-692	4.	East Side #6	Comp. 1 - 4 pm (Duplicate)

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Luyt *		c.c.		(rd)						
Source: Stelco												
Date Sampled: March 23/66 by: J.L.												
Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Phenols in (ppb)	Iron as Fe.		Zinc as Zn.	Tin as Sn.	Ether Solubles
		Total	Susp.	Diss.				Tot.	Diss.			
T-731	21	1486	26	1460	2.4	300	200	293	267	0.7	0.2	16.
T-732	11	308	4	304	6.2	52	400	3.5	0.52	0.5	0.5	4.6
T-733	136	546	416	130	4.3	520	80	26.0	11.7	0.9	---	800.
T-734	225	606	134	472	4.3	700	60	36.1	11.1	1.3	---	630.
T-731	1.	East Side #10		Comp. 1-4 p.m. (Duplicate)								
T-732	2.	East Side #9		Comp. 8:45 - 12:00 noon (Duplicate)								
T-733	3.	East Side #12		Comp. 9:00 - 12:00 noon (Duplicate)								
T-734	4.	East Side #12		Grab 10:00 a.m. - (Duplicate)								

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton		Report to: J. Luyt *		c.c. Chem. Lab. **	
Source: Stelco		(rd)			
Date Sampled: Mar. 22/66 by: J. Luyt					

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron	as	Fe.	Phenols	Ether	Tin		
		Total	Susp.	Diss.			Tot.	Diss.	in ppb	Solubles	as Sn.			
T-685	6.0	400	63	337	7.8	64	13.4	0.13	15	12.	---			
T-686	3.0	154	6	148	8.0	30	1.2	0.08	10	8.4	---			
T-687	15	412	26	386	7.4	53	2.8	0.40	200	3.2	1.5			
T-688	9.2	480	33	447	6.8	83	5.9	0.36	600	8.8	1.0			

T-685	1.	East Side # 11A	Scale Pit Effluent Comp. 2:30 - 4:00 pm (Duplicate)
T-686	2.	East Side # 11B	148" P.M. Cooling Flow Comp. 2:30 - 4:00 pm (Duplicate)
T-687	3.	East Side #9	Comp. 9:30 - 12:00 (Duplicate)
T-688	4.	East Side #9	Comp. 1 - 4 pm (Duplicate)

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gal.

Municipality: Hamilton		Report to: J. Luyt *		c.c.		(rd)	
Source: Stelco							
Date Sampled: March 24/66 by: J. Luyt							

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	Iron as Fe.		Phenols in ppb	Ether Solubles		
		Total	Susp.	Diss.			Tot.	Diss.				
T-757	6.0	502	130	372	7.7	58	65.5	0.19	25	6.6		
T-758	5.2	494	82	412	7.7	48	65.0	0.16	15	13		
T-759	5.8	410	8	402	7.6	28	2.0	0.15	60	0.8		
T-760	4.6	396	8	388	7.5	40	5.2	0.10	20	0.6		

T-757	1.	East Side #11A	Scale Pit Effluent - Comp. 9 - 12 a.m. (Duplicate)
T-758	2.	East Side #11A	Scale Pit Effluent - Comp. 1 - 4 p.m. (Duplicate)
T-759	3.	East Side #11B	Cooling Flow - 148" p.m. - Comp. 9 - 12 a.m. (Duplicate)
T-760	4.	East Side # 11B	Cooling Flow - 148" p.m. - Comp. 1 - 4 p.m. (Duplicate)

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gal.

Municipality: Hamilton

Report to: J. Iuyt *

c.c.

Source: Stelco

Date Sampled: March 21/66 by: J. I.

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Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C O D	Iron as Fe		Phenols in ppb.	Zinc as Zn	Ether Solubles		
		Total	Susp.	Diss.			Tot.	Diss.					
T 655	6.8	410	53	357	7.5	168	19.5	0.24	8	0.2	11.		
T 656	5.6	340	10	330	7.5	11.5	6.7	0.20	60	0.3	**		
T 657	2.8	406	3	403	7.6	214	1.5	0.09	160	0.3	4.4		
T 658	3.6	592	8	584	7.6	229	1.5	0.09	30	0.2	2.2		
T 659	4.8	352	3	349	ex.	**	1.23	0.09	30	0.3	0.0		
** Insufficient sample													

T 655	1.	East Side #11A - Scale pit effluent	Comp. 2.30 - 4.00
T 656	2.	East Side #11A - Scale pit effluent	Grab 11.30 - am
T 657	3.	East Side #11B - 148" pm - Cooling water	Comp. 9 - 12
T 658	4.		Comp. 1 - 4
T 659	5.		Grab 3.30 pm

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm / liter
= 1 lb./100,000 Imp. Gals

Municipality: Hamilton

Report to: J. Luyt *

C.C. Chem. Lab. #2

Source: Stelco

Date Sampled: March 22/66 by: J. Luyt

(rd)

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Acidity as CaCO ₃	C.O.D.	Iron as Fe.		Phenol in ppb	Ether Solubles		
		Total	Susp.	Diss.				Tot.	Diss.				
T-693	1550	1350	810	540	7.5	58	2615	227	5.4	150	9400		

T-693 1. East Side #12 Comp. 1 - 4 pm (Duplicate)

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: March 21/66 by: J.L.

br

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C C D	Iron as Fe		Phenols in ppb.	Zinc as Zn	Ether Solubles		
		Total	Susp.	Diss.			Tot.	Diss.					
T 628	180	650	108	542	3.5	356	25.1	10.0	100	0.5	110.		
T 629	2000	5068	334	4734	5.8	14300	118	117.5	640	6.8	5.7%	(57,000. ppm)	
T 630	**	**	**	**	**	42941	-	-	1200	59.	49.8%	(498,000 ppm)	
T 631	2350	882	362	520	1.4	1620	34.6	11.3	200	1.9	1070.		
<p>** Sample consisted of grease on watery layer</p> <p>Sample wet when weighed</p>													

T 628	1	Comp. 9 - 12)	East Side #12 - Acid Recovery Plant & 80" mill
T 629	2	Comp. 1 - 4		
T 630	3	Grab 2.15 pm		
T 631	4	Grab 3.45 pm		

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Hamilton

Report to: R. C. STEWART *

c.c. Chem. Lab. = *

Source: Steel Company of Canada Ltd.

Date Sampled: Aug. 25/66 by: D. S. TOLSON

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	Cyanide as HCN	Ether Solubles	Phenols in ppb.	Chromo as Cr	Iron as Fe		COD	
		Total	Susp.	Diss.						Tot.	Diss.		
T 2335	21.	348	31	317	7.6	0.0	8.2	6	0.0	6.44	0.21	30.4	
T 2336	24.	314	28	286	12.8	0.0	4.6	8	0.0	3.41	0.21	30.4	
T 2337	24.	664	68	596	3.5	0.0	54	60	0.2	39.5	21.5	73.2	
T 2338	16.	634	176	458	12.9	0.0	55	60	70.	37.5	1.55	116	
T 2339	11.	544	36	508	12.8	0.0	7.6	30	0.0	37.0	14.36	27.0	
T 2340	14.	440	60	380	7.5	0.0	6.6	20	0.0	17.0	1.0	35.	
T 2341	37.	866	152	714	3.3	0.0	- -	15	100.	32.5	6.84	232	

T 2335	1.	)	West influent to east lagoon - Composite - 10:00 am to 1:00 pm										
T 2336	2.	)	- Composite - 1:00 pm to 4:00 pm										
T 2337	3.	)	South influent to east lagoon - Composite - 10:00 am to 1:00 pm										
T 2338	4.	)	- Composite - 1:00 pm to 4:00 pm										
T 2339	5.	)	Effluent from east lagoon - Composite - 10:00 am to 1:00 pm										
T 2340	6.	)	- Composite - 1:00 pm to 4:00 pm										
T 2341	7.		South influent to lagoon - Grab - 2:30 pm										

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated.

1 p.p.m. = 1 mgr. / litre
= 1 lb./100,000 Imp. Gal.

Municipality: Hamilton

Report to: R. C. STEWART *

c.c. Chem. Lab. #

Source: Steel Co. of Canada

Date Sampled: Aug. 24.66 by: D. S. TOLSON

hr

Lab. No.	5-Day B.O.D.	Solids			Total Kjeldahl as N	Zinc as Zn	Acidity		Alkalinity					
		Total	Susp.	Diss.			C Ca	S CO ₃						
T 2335					1.70	0.0	-		90					
T 2336					1.00	0.0	-		98					
T 2337					5.00	0.9	-		-					
T 2338					3.30	0.7	-		0					
T 2339					2.80	0.6	-		30					
T 2340					1.70	0.0	-		40					
T 2341					2.50	2.8	-		-					

ONTARIO WATER RESOURCES COMMISSION CHEMICAL LABORATORIES INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gal.

Municipality: Hamilton

Report to: J. Luyt *

c.c.

Source: Stelco

Date Sampled: Mar. 23/66 by:

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	pH at Lab.	Iron	as	Fe.	Cyanide as FCM	Ether Solubles	Phenol in ppb	Free Ammonia
		Total	Susp.	Diss.			Tot.		Diss.				as N
T-701	6.0	668	324	344	106	8.0	18.2		0.08	3.1	2.8	400	6.56
T-702	8.4	382	12	370	19	6.9	3.32		0.31	0.0	0.8	4	4.92

T-701 1. North Thickener Effluent - Grab.

T-702 2. North Quench Overflow - Grab.



Date Due

[illegible]

MOE/HAM/IND/ASZS
Ontario Water Resources Co
Industrial waste
survey of the Steel Co. aszs
of Canada, Ltd. C.1 a aa



Environment Ontario

Laboratory Library
125 Resources Rd.
Etobicoke, Ontario M9P 3V6
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